WHAT IS CLAIMED IS:

1. A system for analyzing vehicle and driver behavior, comprising:

a data preprocessing means that converts operation information of an in-vehicle electrical system, data available via an in-vehicle data network, and additional information available from an electrical device constituting a vehicle into a format capable of calculation therein;

a vehicle model and estimation means that estimates non-measurable variables in an in-vehicle sensor based on the preprocessed data from the data preprocessing means;

a model-based reconstruction means that reconstructs an accident scenario by unifying the preprocessed data from the data preprocessing means and the estimated variables from the vehicle model and estimation means to a common time stamp; and

an assessment means that assesses vehicle and driver behavior based on the accident scenario reconstructed by the model-based reconstruction means.

2. A system for analyzing vehicle and driver behavior according to claim 1, wherein the data preprocessing means includes:

a signal converting portion that converts signal levels of the operation information of the in-vehicle electrical system and the additional information available from the electrical device

constituting the vehicle into a signal level used in a microprocessor;

a signal decoding portion that decodes the data available from the in-vehicle data network;

a filter processing portion that performs filter processing on a signal from at least one of the signal converting portion and the signal decoding portion; and

an analog to digital converting portion that converts an analog signal from the signal converting portion into a digital signal.

3. A system for analyzing vehicle and driver behavior according to claim 1, wherein the vehicle model and estimation means includes:

a vehicle velocity estimation portion that determines a vehicle velocity at a center of gravity as the non-measurable variable in the in-vehicle sensor based on the preprocessed data from the data preprocessing means;

a drive model portion that determines a drive torque using a drive model obtained by constructing a vehicle powertrain in an equation based on the preprocessed data from the data preprocessing means;

a vehicle mass estimation portion that estimates a vehicle mass as the non-measurable variable in the in-vehicle sensor based on the preprocessed data, the vehicle velocity at the center of gravity, and the drive torque;

a wheel model portion that calculates a tire side slip angle

and forces acting on a wheel as the variables which can not be measured by means of in-vehicle sensors using a wheel model obtained by constructing the wheel in an equation based on the preprocessed data and the vehicle velocity at the center of gravity; and

a state space model portion that derives a vehicle body side slip angle as the non-measurable variable in the in-vehicle sensor using a state space model obtained by constructing a running vehicle state in an equation based on the preprocessed data, the vehicle velocity at the center of gravity, the vehicle mass, and the forces acting on the wheel.

4.   A system for analyzing vehicle and driver behavior according to claim 1, wherein the model-based reconstruction means includes:

a signal state reconstruction portion that reconstructs a signal available through an operation of a driver with time among the preprocessed data from the data preprocessing means;

a trajectory reconstruction portion that reconstructs the vehicle position and its orientation based on the preprocessed data from the data preprocessing means, the estimated variable from the vehicle model and estimation means, and data input from outside;

a vehicle state variable reconstruction portion that determines variables with time, which represent a vehicle state based on the preprocessed data from the data preprocessing means, the estimated variable from the vehicle model and estimation means, and the data

input from outside; and

a vehicle environment reconstruction portion that reconstructs a vehicle environment with time based on the preprocessed data from the data preprocessing means, the estimated variable from the vehicle model and estimation means, and the data input from outside.

5. A system for analyzing vehicle and driver behavior according to claim 1, wherein the assessment means includes:

a driver assessment means that assesses an operation and behavior of a driver based on the accident scenario reconstructed by the model-based reconstruction means;

a vehicle behavior assessment means that assesses a vehicle behavior based on the accident scenario reconstructed by the model-based reconstruction means;

a vehicle environment assessment means that assesses a vehicle environment based on the accident scenario reconstructed by the model-based reconstruction means; and

a relation evaluating means that evaluates a relationship among the operation and the behavior of the driver by driver assessment means, the vehicle behavior by the vehicle behavior assessment means, and the vehicle environment by the vehicle environment assessment means.

6. A system for analyzing vehicle and driver behavior according

to claim 1, wherein:

the data preprocessing means and the vehicle model and estimation means are carried out in the vehicle;

the vehicle model and estimation means is carried out in real time; and

the model-based reconstruction means and the assessment means are carried out outside the vehicle.

7.   A system for analyzing vehicle and driver behavior according to claim 1, wherein:

the data preprocessing means and the vehicle model and estimation means are carried out in the vehicle; and

the model-based reconstruction means and the assessment means are carried out outside the vehicle.

8.   A system for analyzing vehicle and driver behavior according to claim 1, wherein:

the data preprocessing means is carried out in the vehicle; and

the vehicle model and estimation means, the model-based reconstruction means, and the assessment means are carried out outside the vehicle.